REMARKS

In the Office Action, claims 1-9 and 11-17 were rejected. The Examiner objected to claim 10 but indicated that the claim recited allowable subject matter. By the present Response, claim 14 is amended, claim 10 is canceled without prejudice and new claim 18 is added. Upon entry of the amendments, claims 1-9 and 11-18 will remain pending in the present patent application. Reconsideration and allowance of all pending claims are requested.

Claim Objections

Claim 14 was objected to because of insufficient antecedent basis for the recitation "said sensor parameter". By the present response, the claim has been corrected to use a term for which sufficient antecedent basis is provided. Reconsideration and allowance of this claim is requested.

Rejections Under 35 U.S.C. § 103

Claims 1-9 and 11-17 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,049,033 (Corsmeir et al., hereinafter "Corsmeier") in view of U.S. Patent No. 6,626,635 (Prowse et al., hereinafter "Prowse") and U.S. Patent 3,227,418 (West).

Claim 1 recites a system for controlling blade tip clearance in a turbine. The system includes a stator including a shroud having a plurality of shroud segments, a rotor including a blade rotatable within shroud and an actuator assembly positioned radially around the shroud, the actuator assembly including a plurality of actuators. The system also includes a sensor for sensing a turbine parameter and generating a sensor signal representative of the turbine parameter, a modeling module generating a tip clearance prediction in response to turbine cycle parameters and a controller receiving the sensor signal and the tip clearance prediction and generating at least one command signal. The actuators include at least one actuator receiving the

command signal and adjusting a position of at least one of the shroud segments in response to the command signal.

The Examiner argued that Corsmeier discloses a system for controlling blade tip clearance in a turbine that includes a shroud having a plurality of shroud segments, a rotor including a blade rotatable within the shroud and a controller receiving the sensor signal and the tip clearance prediction and generating at least one command signal. Further, the Examiner argued that Corsmeier also teaches actuators including at least one actuator receiving the command signal and adjusting a position of at least one of the shroud segments in response to the command signal. The Examiner cited the passages at col. 5, lines 28-61, col. 7, lines 39-46 and col. 8 lines 36-41 in support of the rejection.

However, the Examiner acknowledged that Corsmeier fails to disclose an actuator assembly positioned radially around the shroud, where the actuator assembly including a plurality of actuators, a sensor for sensing a turbine parameter and generating a sensor signal representative of the turbine parameter and a modeling module generating a tip clearance prediction in response to turbine cycle parameters.

The Examiner suggested that Prowse teaches a sensor for sensing a turbine parameter, and generating a sensor signal representative of the turbine parameter and a modeling module (a predetermine program) generating a tip clearance prediction in response to turbine cycle parameters. The Examiner stated that it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a sensor for sensing a turbine parameter and a modeling module generating a tip clearance prediction in response to turbine cycle parameters as taught by Prowse in a system for controlling blade tip clearance in a turbine of Corsmeier. The purported motivation was said to be providing a system for controlling clearance

between the tips of blades of rotary machinery and a surrounding casing during start-up and steady-state operating modes of the machinery.

Furthermore, the Examiner relied upon West to teach an actuator assembly positioned radially around a shroud, wherein the actuator assembly includes a plurality of actuators.

Applicants respectfully submit that Prowse does not disclose a modeling module for generating tip clearance prediction in response to turbine cycle parameters. The Examiner has cited the passage at col. 4, lines 14-32 of Prowse for these techniques.

The cited passage reads as:

> Additionally, the temperature and pressure sensors 42 and 44, respectively, as well as temperature sensor 66 supply information to the system controller 76 whereby the system is controlled to open and close or modulate the various valves in accordance with a predetermine program.

As can be seen from the cited passages, Prowse discloses the control of the various valves in accordance with a predetermine program. The reference does not teach the prediction of tip clearance in response to turbine cycle parameter via a modeling module. The feedback control of the valves in accordance with a predetermine program does not imply tip clearance prediction by the predetermine program.

Applicants respectfully submit that none of the cited references teaches a modeling module for tip clearance prediction in response to turbine cycle parameter. Further, the control of the tip clearance via the predetermine program does not guarantee control of the valves based upon the tip clearance prediction.

Applicants respectfully submit that even in combination the Corsmeier, Prowse and West references do not establish a *prima facie* case of obviousness. Specifically, even together, Corsmeier, Prowse and West do not disclose or suggest prediction of tip clearance based on the turbine parameters and the control of the clearance based upon sensed parameter and predicted tip clearance. Therefore, Applicants submit that independent claim 1 is allowable and respectfully request the Examiner to reconsider and withdraw the rejection of the claim.

Claim 12 recites a method for controlling blade tip clearance in a turbine having a blade rotating within a shroud having a plurality of shroud segments. The method includes obtaining a turbine parameter, generating a tip clearance prediction in response to cycle parameters. The method also includes generating at least one command signal in response to the turbine parameter and said tip clearance prediction and providing said command signal to an actuator to adjust a position of at least one of the shroud segments.

As discussed above with reference to claim 1, Corsmeier, Prowse and West do not disclose a modeling module for generating a tip clearance prediction in response to turbine cycle parameters. Further, Corsmeier, Prowse and West do not teach a method for generating a tip clearance prediction in response to the turbine cycle parameters. In addition, the cited references do not teach adjusting a position of at least one of the shroud segments in response to turbine parameter and the tip clearance prediction.

Applicants respectfully submit that absent any teaching regarding the recitations of claims 1 and 12 regarding prediction of tip clearance based upon the turbine parameters, Corsmeier, Prowse and West, even in combination, do not establish a *prima facie* case of obviousness. Even in combination Corsmeier, Prowse and West do not disclose or suggest a modeling module for tip clearance prediction for controlling the position of the shroud segments. Therefore, Applicants submit

that independent claims 1 and 12 are allowable and respectfully request the Examiner to reconsider and withdraw the rejection of the claims.

With regard to dependent claims 2-9, 11 and 13-17, these claims depend directly or indirectly from allowable claims 1 and 12, and are therefore considered to be allowable at least by virtue of their dependency from an allowable base claim.

New claim 18

Claim 18 is believed to be allowable for the same reasons as claims 1 and 12. Claim 18 recites features from claim 1 and certain allowable subject matter from claim 10 to include recitations regarding the actuator including an inflatable bellows in fluid communication with a pump, the command signal being applied to the pump to control pressure of the inflatable bellows. Applicants submit that independent claim 18 is in condition for allowance.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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PSY

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